Categories and Subcategories

Categorías y subcategorias

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Abstract: Starting from the traditional distinction between the minimal and the maximal division, the role of subcategories in Aristotle, as well as that of the highest categories, is discussed. The need for categorial properties which determine categories is pointed out. It is argued that an existent cannot have two such essential properties and that only the lowest subcategories have simple categorial properties. Furthermore, it is emphasised that categories and subcategories must form a tree because they belong to a theory of categories which requires unity. By contrast, it is held that the hierarchy of all concepts need not form a tree. The difficulties Porphyrius and Simplicius find in Aristotle's minimal and maximal division are analysed. Finally, Aristotle's way of avoiding categorial properties by referring to an abstraction is criticised.

Keywords: Category, subcategory, Porphyrian Tree, Minimal and Maximal Division, categorial property.

Resumen: El artículo discute el papel tanto de las categorías supremas como el de las subcategorías a partir de la tradicional distinción aristotélica entre una división mínima y una división máxima del ente. Señala que para determinar las categorías son necesarias las propiedades categoriales. Se argumenta que un existente no puede poseer dos propiedades esenciales de tipo categorial, mientras que solo las subcategorias más bajas en la escala poseen propiedades categoriales simples. Se señala, además, que las categorias y las subcategorias se organizan en un árbol según una cierta unidad y que, por el contrario, los conceptos no se jerarquizan necesariamente formando un árbol. También se analizan las dificultades que Porfirio y Simplicio encontraron en la división mínima y máxima de Aristóteles. Finalmente, el artículo critica el modo en que Aristóteles evita, a través de la abstracción, la referencia a las propiedades categoriales.

Palabras clave: Categoría, subcategoría, Árbol de Profirio, división minima y maxima, propiedad categorial.

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0. The Issues

In Aristotle's book *Categoriae* there is a minimal division of all existents into two categories, namely substances and accidents and a maximal division into ten categories, namely primary substances, secondary substances, quantities, relations, qualities, places, times, states, actions, and affections. Why this two-fold division and how do the two divisions go together? The latter are subcategories of the former. Thus the question is again why categories as well as subcategories are needed. Wouldn't the subcategories suffice?

Since categories are classes and since, obviously, they are not merely enumerative classes but rather extensions there arises the need for categorial properties of which the categories are extensions. Moreover, a clash between the categorial properties threatens because existents are necessarily members of the upper categories as well as of their subcategories. Categorial properties should be necessary properties and such properties have to be very closely connected. That poses the question whether an existent can have more than one categorial property and if not whether the maximal and the minimal division are compatible or how they can be reconciled. Thus, the question is also whether it is even consistent to advocate both a minimal and a maximal division.

The minimal division has a problematic entailment if it is taken to be the highest level of the categorial hierarchy. It entails that there is no top and thus no categorial tree but rather a categorial forest with several trees. The maximal division is the lowest categorial division and thus the borderline between categorial and non-categorial division. Therefore the question arises why to draw the borderline there and not somewhere else.

I should make clear that the paper does not offer a detailed historical representation but rather a rational and systematic reconstruction of the project of a theory of categories as a hierarchy of classifications. The most influential conception of this project originated from Aristotle. The following discussion revolves around the constraints of classificational hierarchies (also called "Porphyrian Trees").

1. Class Hierarchies

Consider a very simple class hierarchy. The class of triangles is subdivided into equilateral and scalene triangles. Thus the classes of equilateral and scalene triangles are subclasses of the class of triangles. One can represent that in a tree graph which visualises the talk of a hierarchy. The branches of the tree (mathematicians say "edges"[1]) are formed by the subclass relation. Now, the designations of the classes refer to certain properties which its members have. I hold that classes normally are determined by properties. Which are the properties determining the three classes of our example? The upper class of the hierarchy seems is determined by the property of having three angles. That is what the designation "triangle" implies. The lower classes are presumably determined by the conjunctive property of having three angles and of having sides of the same length and by the conjunctive property of having three angles and of having sides of differing length. Obviously, the lower properties contain the higher properties as conjunctive parts. Thus the branches of the tree graph can also be interpreted as part relations between properties and the vertices of the tree would then be the properties determining the classes. Furthermore, all the lower properties would be conjunctive properties. Only the highest property could be a simple one. Thus we would, strictly speaking, have two tree graphs which are congruent: a tree graph of classes and a tree graph of properties. They would be rather small trees and they would not be trees of categories. But they can possibly be integrated into a huge tree encompassing all kinds. The top area of that tree would be occupied by categories. The size of the top area is variable depending on the respective ontology. It might be only the highest vertex and a two-fold division below or it might comprise more levels of vertices and longer chains of edges. The huge and all-encompassing tree has traditionally been called the "Porphyrian Tree".

Like in any tree graph there are no circles in a Porphyrian tree, i.e., if one moves down one will not return to any vertex. Although

1. See for example G. Chartrand, *Introductory Graph Theory* (Dover, New York, 1985).

branches (edges) run only vertically the graph not only shows subordination and superordination but also co-ordination of vertices. Vertices on the same level and subordinated to the same next upper vertex are said to be co-ordinated. Co-ordinated vertices form classifications together and thus it holds that the respective classes are disjunct (i.e. they don't have any members in common) while their union class is identical with the class of the next superordinate vertex. As a consequence it holds that co-ordinate categories always form a classification together. Thus co-ordinate categories exclude each other, i.e., they imply the negation of each other. Substance and accident in Aristotelianism, for example, are co-ordinate categories and it is assumed that a substance cannot be an accident and an accident cannot be a substance. If they form a categorial classification together, then it follows also that any existent must be either a substance or an accident.

2. Categories and Definitions

The above paragraph contains the view that categories are classes and that they are determined by properties. The view is not exactly Aristotle's but it is a clear view and it allows explicating and discussing Aristotle's view. The properties which determine the categories will because of their role be called "categorial properties". A subcategory is subclass of the category of which it is subcategory. Looking at a Porphyrian Tree one realises that a subcategory is subcategory of exactly one category while a category has always more than one subcategory if it has subcategories at all. Obviously not all categories can have subcategories. There must be lowest subcategories.

As to the categorial properties of which the categories are the extensions there is also a part-whole relation between the categorial property of a subcategory and the category of which it is subcategory. Naturally, this part-whole relation is different from the subclass relation. It is based on the conjunction of properties. Moving down from a category to a subsequent subcategory one property is added in terms of conjunction to the categorial property of the superordinate category. Thus the conjunctions of properties get longer and longer if one moves downward.

By the addition of a property the resulting subcategorial property becomes more specific than the superordinate categorial property. The way down the Porphyrian Tree is not only a way from class to subclass and from shorter to longer conjunctive properties but it is also a way of specification and of increasing specificity. The longer conjunctive properties are more specific than the shorter conjunctive properties in a chain of branches (edges) down the tree graph. That is visible by the categories (i.e. classes) themselves, which become smaller and smaller when one moves down the tree on a branch (edge) chain. Obviously, a limit would be reached if a category had only one member. Then it would be maximally specific. But I would argue that a category need not be a one-member category to be maximally specific and that specificity is to be attributed primarily to categorial properties.

The chain of specification of the categorial properties by adding and conjoining a property reminds, of course, of Aristotle's method of definition designed to place a category or another sort of existent in the Porphyrian Tree by indicating its genus proximum and then adding a differentia specifica. Yet Aristotle does not admit properties which determine categories at the top of the Porphyrian Tree. Rather, he holds that only what is placed at the lowest vertices of the Porphyrian Tree (hence the maximally specific) exists while the higher vertices are mere concepts formed by us by abstracting and indeterminately representing concreta placed at the lowest vertices.[2]

Moving down a Porphyrian tree from one vertex to the next one goes from a less specific to a more specific property, which is a specification of the upper property. Continuing to go down one finally arrives at a maximally specific property. There are specification chains from the uppermost property to the maximally specific properties. There are more than one maximally specific properties but they are all specifications of the uppermost property. In a Porphyrian Tree there is only one uppermost property and it is the least specific of all. It could be described also as the maximally unspecific property. In most ontologies it is the property of being

2. Aristotle, *Categoriae*, 4f; *Topica* I/8; *Metaphysica*, M 4.

an existent but in Brentano, for example, it is the property of being a thing.[3]

A Porphyrian Tree is a structure. It shows a number of categories in their relations and it thereby characterises a category structurally, i.e., by its position in the structure, by its being related with respect to specification to certain other properties. Therefore, each category must occupy only one position or, in other words, it must occupy only one vertex of the tree. It is an important principle of a Porphyrian Tree that a property has only one position in it and that it must not occupy more than one vertex. Call it the "Position Principle".

The highest property of a Porphyrian Tree plays a crucial role. From it all chains of specification start and it connects them all. Without it we would not have a tree but rather what the mathematicians call a "forest" which lacks unity and connectedness. Some scholars take Aristotle to deny that there is a highest category and to claim that there are several such categories. That would entail that there is no Porphyrian Tree but only a Porphyrian forest consisting of several trees. I think Aristotle is well aware of the need for a connected and united Porphyrian Tree. Even in *Categoriae* there is one central category and in *Metaphysica* the individual substance with its essence is also the proper existent (*ousia*). The proper existent is reasonably understood to be the only existent.

Now, most ontologies have not only categories but also subcategories. Thus, there is not only the highest category but additional categories on lower levels which have been characterised above as subcategories. However, subcategories are also categories. They are categories which are subclasses of other categories. Where there are several levels of subcategories one can distinguish between immediate and mediate subcategories. The highest categories are, of course, not also subcategories.

Why do ontologists use not only categories but also subcategories? The question is all the more urgent since (as we shall see in §6) subcategories leads into a certain difficulty which would not arise with only one category and no subcategories. It seems that there is

3. F. Brentano, *Kategorienlehre* (Meiner, Leipzig, 1923).

no tree-theoretic reason for having subcategories. Presumably, it is just that more than one category is required to furnish an adequate ontological analysis of all the phenomena which are the domain of ontology such as existence, diversity, qualitative equality and difference, complexity, relation, necessity and possibility.

3. The Minimal Division

From each vertex of a tree graph at least two connections lead downward. As was mentioned already, they are part-whole relations in Porphyrian trees between classes and between the properties which determine the classes. At the top of the Porphyrian tree the classes are categories. As was also mentioned, the immediate subcategories of a category are disjunct part classes of the category which jointly exhaust the category, i.e., their union is identical with the category. Therefore the subcategories of a category together can be characterised as a division of the category. The category is divided by the immediate subcategories into part-classes. That is what is meant when Aristotle's commentators Porphyrius and Simplicius refer to a minimal and a maximal division.[4] The minimal division is the smallest group of immediate subcategories of the top category[5] and the maximal division is the biggest group of subcategories which are the lowest categories in the Porphyrian tree. They have a problem with his categories of substance (*ousia*) and accident (*symbebekos*) as they are introduced in Aristotle's *Categoriae*. They argue that it is not a correct minimal division, i.e., substance and accident cannot be two co-ordinated categories in a Porphyrian tree, because a substance is a substance either by being a particular or by being a general substance, (i.e., a genus). Thus, they conclude that the respective minimal division should have four rather than two categories, namely the categories of particular substance, general substance, particular

4. Porphyry, *On Aristotle's Categories* (Cornell UP, Ithaca/New York, 1992) 71/1 and Simplicius, *On Aristotle's Categories*, vol. 1/4 (Cornell UP, Ithaca/ New York 2003) 67/1.
5. I have to mention that Porphyry and Simplicius seem to think of the minimal division as the highest top of the forest of categories. As can be gathered from the discussion of §2 that seems to me unsatisfactory.

accident, and general accident. The argument of Porphyrius and Simplicius is clearly not sound. It leads to the absurd consequence that only the maximally specific properties are categories because it can be applied again and again until the bottom of the tree is reached. The conclusion is absurd since categories have to be on the upper levels of the tree. However, the conclusion accords in way with the Aristotelian view mentioned above that only the maximally specific is real while the higher levels are mere abstractions.

Nevertheless, Porphyrius and Simplicius have a point. Aristotle uses in *Categoriae* a fourfold table. To transfer its content into a Porphyrian tree requires the formation of four categories by combining the categories of substance and accident and particular and general. That would be a breach of the Position Principle explained above that no category is allowed to occur twice in a tree and to occupy more than one position in it. As subcategory of the category of substance and also of the category accident the category of particular would take two positions. The same is true of the category of general. Such a breach of the Position Principle would not occur if there were instead Porphyrius' and Simplicius four co-ordinated categories of particular substance, general substance, particular accident, and general accident.

It should be noted that what Porphyrius and Simplicius call "the minimal division" cannot be the top of the Porphyrian tree. A division is a group of co-ordinated subcategories. A tree needs an undivided top to give it connectedness and unity. However, Porphyrius' and Simplicius' argument would apply not only to a two-category division but also to the highest category (for example, the category of existents) at the top of the Porphyrian tree. It would lead to the exclusion and elimination of any highest category. Without the top vertex we would, in the terminology of mathematical graph theory, not have a tree but a forest. In other words, the tree of categories would lack connectedness and unity.

However, since Porphyrius' and Simplicius' argument is not sound there is no impediment to assume one highest category. Many scholars take Aristotle to reject a highest category. I think that it can be disputed. His term of "*ousia*" must be translated as "proper existent". That might be the highest category, at least in Aristotle's

Metaphysica where in book Z it is claimed that there can be definition and division only for substances (*ousiai*). Even in *Categoriae* the first substance (the particular) is taken to be the primary category which is to a certain degree equivalent with its placement at the top of the Porphyrian tree.

If the assumption of most Aristotle scholars is true that *Categoriae* is an earlier work and that *Metaphysica* was written by the mature Aristotle he moved to the acceptance of one highest category and thus returned to a position close to Socrates and Plato. Anyway, the view of *Metaphysica* Z that the nature (*eidos*) of a particular is the proper being (*ousia*) strikes one as definitely Platonic. It implies an abandonment of the particulars (*prote ousiai*) of the *Categoriae* and a reconception of the kinds (*deutero ousiai*).

Contemporary metaphysicians who take category theory seriously, also have a hard time to find a single top category and uphold a categorial tree. However, Gustav Bergmann had in the ontology of his middle period even a simple categorial essence for the top category of entities (existents). He called it "existence".[6] The Later Bergmann has dropped existence and even uses the term "entities", which is earlier a synonym of "existent", as the name of a subcategory.[7] The Earlier Grossmann[8] has a top category of entities which is comprehensive. For the Later Grossmann the term "entity" refers to a variable which is what a variable symbol in a formalised sentence stands for according to his view. [9] Since the sentence represents a fact a variable is a constituent of a fact and since there are constituents of facts which are not variables the category of entity in the later Grossmann cannot be the all-encompassing top category.

Thus it seems that the Later Bergmann and the Later Grossmann are left with a categorial forest rather than with a tree of categories. Admittedly, the later Grossmann has again a maximally

6. G. Bergmann, *Realism* (University of Wisconsin Press, Madison, 1967) 4.
7. G. Bergmann, *New Foundations for Ontology* (University of Wisconsin Press, Madison, 1992) 56.
8. R. Grossmann, *Ontological Reduction* (Indiana University Press, Bloomington, 1973) 178f.
9. R. Grossmann, *The Existence of the World* (Routledge, London and New York, 1992) 107.

comprehensive concept, that of an object of a mental act.[10] But under this concept fall, according to Grossman, also non-existents and an ontological category comprises by definition only existents. Therefore, objects cannot play the role of top of a categorial tree.

4. The Maximal Division

The more important issue is the maximal division, more precisely, the maximal categorial division. It is the question where to draw the line in a Porphyrian tree between the lowest categorial division and the next lower division which is not categorial. Remember the remark above that only the highest vertices of the Porphyrian tree are occupied by categories. So, one has to draw the boundary somewhere between the categorial and the non-categorial. We will see that there is a good reason to draw such a boundary at a certain level and thus to distinguish the lowest subcategories from further specifications which are not subcategories.

Porphyrius and Simplicius contrast their minimal division to the maximal division of Aristotle by which they refer to Aristotle's ten categories of *Categoriae*. The term "maximal division" suggests that there is no finer division and that in Aristotle's ontology there cannot be more subcategories than those ten. But there are, obviously, finer divisions and Aristotle is aware of them. The ten categories form just the top of a big Porphyrian tree the branches of which spread out to the most specific. The question arises therefore why to make the cut where Aristotle does make it and how to decide that what is at lower vertices of the tree are not categories. The answer given by Aristotle's commentators is semantical, namely, that the ten categories are sufficient to explain the meaning of all sentence parts which have a representative role. Now, one may doubt the congruence of ontology and semantics implied by the answer but it can be interpreted also as the claim that the ten categories are sufficient to analyse all elementary and ubiquitous phenomena, which are the domain of ontology.

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10. *Ibidem*, 114.

That answer is legitimate although rather unspecific and global. It amounts merely to the claim that Aristotle's ten-category-ontology is on the whole successful and adequate. A more specific and more decidable answer can be given for ontologies with facts as complexes having constituents of different categories. There are rules of combination in this ontology, which are based on ontological categories. They determine which entities form together facts depending on their category. The maximal division can be defined as comprising all the categories which occur in the rules of combination for the facts.

Consider an ontology with the categories of particulars, universals, and facts consisting of particulars and universals. That the division of the highest category of existents into particulars, universals, and facts cannot be the maximal division is shown by looking at the rules of combinations into facts. There is no combination rule according to which a particular and a universal form a fact together. Rather a subcategory of the category of universals is needed. The pertinent rule determines that a particular and a non-relational universal of the first order combine into a fact. Hence, the categories of particular and non-relational universal of the first order belong to the maximal division and are lowest categories while the category of universal is not one of the lowest categories.

5. Category and Categorial Essence[11]

What makes a substance, for example, a substance? What makes something a member of a certain ontological category? What grounds category membership ontologically? The explications of the first paragraph suggest that the membership is based on hav-

11. See also E. Tegtmeier, *Categories and Categorial Entities*, in J. Cumpa , E. Tegtmeier (eds.), *Ontological Categories* (Ontos , Frankfurt, 2011), where I use the term "categorial entity" rather than "categorial essence". The problem of categorial essences has be discovered in recent times by Gustav Bergmann who explained it in his paper *Ineffability, Ontology, and Method* (1960) republished in G. Bergmann, *Logic and Reality* (University of Wisconsin Press, Madison, 1964). Bergmann does not bother about categorial essences for all his categories and about their compatibility.

ing a certain property. However, that does not seem to accord with the traditional Aristotelian view. Aristotle answers that this man is a substance because he is a man and because a man is a substance. It would not be correct to say that according to Aristotle being a man entails being a substance. Aristotle does not accept being a substance as a distinct property rather he considers it as mere abstraction, as was mentioned already. I would argue that abstraction is an epistemological concept and that category membership needs an ontological ground. To explain how we grasp a certain attribute does not answer the question what that attribute is.

The ontological grounds of category membership I advocate are specific properties which could be called "categorial essences". The concept of essence is, of course, adopted from Aristotle, namely from *Metaphysica Z*. But it is modified. In Aristotle humanness (what it is to be a human) is an example of an essence while it would not be a categorial essence. What it is to be an accident (call it accidentality) and what it is to be a particular (particularity) would serve as examples of categorial essences if Aristotle countenanced such essences. Compared to Aristotle's essences which are specific, categorial essences seem rather unspecific. That is not astonishing since the categorial essences are not placed at the bottom of the Porphyrian Tree like Aristotelian essences but at its top.

With categorial essences a difficulty arises similar to the one discussed above concerning the cut between the lowest categories and the lower region the Porphyrian Tree. This time it is not the difficulty to justify the level at which the cut is placed but rather to make sense of the difference between categorial essences and the normal properties of the lower region. It is a difficulty because of the continuity between categorial and normal properties in the edge chains of the all-encompassing Porphyrian tree. Assuming such a tree, the property carmine, for example, is considered to be a specification of the property red and the property of a red a specification of the property of colour and the property of colour to be a specification of the property of property.

The ontology I advocated offers a solution of the difficulty. According to it there is not the all-encompassing Porphyrian Tree of properties but only such a tree of classes determined by our con-

cepts, not by properties in a specification chain. I would claim that "red" does not represent a property but only a similarity class and that "colour" is not in that specification chain at all because it is not a property of material objects like the property carmine but a property of properties, for example of the property of carmine. Carmine has the property of being a colour. Thus in my view there is no long edge chain from the categories to the lowest vertices of the all-encompassing Porphyrian tree. Rather, the categories face only the lowest vertices as far as the properties are concerned. Thus there is a natural trench between them, so to speak. It is a consequence of the existence of properties of properties which is assumed in the ontology with facts. It may be suspected to be incommensurate with the demand for a unitary categorial tree made above. But that demand is related to a unitary theory of categories and to a limited domain while the all-encompassing Porphyrian tree covers a rather inhomogeneous and very large domain.

Essences in Aristotle's *Metaphysica* such as being a man are very closely related to the particulars of which they are essences. Some of Aristotle's statements in *Metaphysica* suggest even that both coincide which would imply that essences are tropes. Categorial essences as here assumed are also closely related to the existents which thereby belong to exactly one category. They are more closely related than ordinary properties and in such a way that they become inseparable. They are connected in such a way that it is impossible for them not to be connected to the existent to which they are connected. This ontological analysis of the connection of categorial essences captures the phenomenon of the necessity of category memberships and the equivalent impossibility of alternative category memberships. Notice that in Aristotelianism it is mostly taken for granted that a substance cannot change into an accident and that an accident cannot change into a substance in spite of substantial changes on a more specific level.

6. The Difficulty of Multiple Category Membership

In Aristotle it is not only clear that the essence cannot get lost and cannot change but also that an existent cannot have two different

essences. Correspondingly for the ontology with categorial essences I advocate it holds that no existent has two categorial essences. I would advance two arguments against the admission of more than one category of an existent: Firstly, the very close relationship between categorial essence and the categorised existent seems to exclude more than one categorial essence. Secondly, if there were categorial essences for a category as well as for its subcategories, they would get in each other's way and the higher categorial essence would seem superfluous, as for example when one attributes the categorial essence of being an accident and also of being a quality. It is as odd as describing an object as red and carmine.

The difficulty arises because any existent which belongs to a subcategory also belongs to the superordinate categories and if each category would be determined by a categorial essence existents would have several categorial essences. That is what we excluded. [12]

How to solve the difficulty? In my view it is out of the question to give up the maximal division in favour of as lesser division because the categories involved are necessary for the categorial rules of combination. Moreover, the difficulty would remain as long as there were any subcategories. Hence it would be solved only if one fell back to the highest category. But a one-category ontology with no subcategories would hardly furnish adequate ontological analyses of all ontologically relevant phenomena. However, to keep only the lowest subcategories and drop the higher category would take away the unity of the Porphyrian tree, in fact, turn it into a graph which would not be a tree since it would eliminate the highest vortex (the highest category). Instead of a tree there would be only a forest of separate trees.

12. In Grossmann's ontology that is not excluded because he considers categorial essences as normal universals which are external to the entity which exemplifies it. All properties are likewise connected by the relation of exemplification to the property owners. See R. GROSSMANN, *Ontological Reduction*, cit., 143f. However, in Grossmann analysis the necessity of categorial essences is lost. Bergmann does not realise the difficulty. He thinks he can get along with just the categorial essences of particularity and universality See: G. BERGMANN, *Realism* cit., 70. Bergmann's categorial essences are internal.

7. Categories without Categorial Essences

There seems to be only one way out, namely to accept categories which are not determined by categorial essences. Only the lowest subcategories can be taken to be determined by such essences while the higher categories must be taken to be determined in another way. The lowest subcategories take priority because their categorial essences are required for the ontological laws of combination, as was indicated already.

How then are the higher subcategories and the highest category determined? Not by simple properties or short conjunctions of such but by more complicated properties which take into account many situations of the members of the respective categories. Let us call those complicated properties "categorial criteria". Categorial criteria descend mostly from Parmenides' signs of being. Look for example at Aristotle's criteria of a substance (*ousia*) in *Metaphysica* Z. Being simple and being independent and being identifiable (*tode ti*). In *Categoriae* Aristotle characterises a substance as independent but an accident as dependent. In my ontology things which belong either to the subcategory of particulars or to the subcategory of universals are characterised as simple. The category of things is contrasted with the category of facts which are complexes. However, being simple and being complex are not considered to be simple or conjunctive universals. Similarly, in Aristotle being independent and dependent are not considered to be accidents.

However, it seems that Aristotle tends to characterise also the categories of the maximal division in terms of categorial criteria. Relations, for example, are described as accidents which least satisfy the criteria of a proper being.[13]

13. Aristotle, *Metaphysica* 1088a.

8. Specification and Abstraction

There is an implicit alternative solution of the difficulty of multiple category membership which can be attributed to Aristotle.[14] He starts from the observation that the more specific property contains in some sense the less specific ones up to the least specific which suggests that the specification suffices and grounds all upper properties it specifies. Hence one can confine oneself to the maximally specified (*species specialissimae*) and yet have the ontological grounds for all upper properties. When Aristotle says that the upper properties of a Porphyrian Tree are contained in the lower ones he does not mean that the lower properties are complex and composed of the higher ones. Rather he holds the properties (more precisely, the essence of a substance which is identical with that substance) to be simple. It is only the definition of the property which has parts. Aristotle conceives of the containedness of the upper properties in epistemological terms. We can apprehend the upper properties by apprehending the lower ones in an indeterminate way. Aristotle assumes that we arrive at the property of being a substance (*ousia*) by apprehending a more specific property in a maximally indeterminate way. That can be understood as a kind of abstraction. My objection to this view is again that the problem is ontological whereas Aristotle's solution is epistemological and therefore not adequate. Nevertheless, the view could be the reason why the problem has not been noticed in the tradition.

9. Results

From a graph-theoretical point of view the minimal division is problematic as top of the categorial hierarchy because it prevents unity in the sense of connectedness and produces a categorial forest rather than a categorial tree. However, the Later Aristotle offers also a categorial hierarchy which is a tree after all. A conflict between the minimal and the maximal division of Aristotle and in general

14. See F. Brentano, *Aristoteles und seine Weltanschauung* (Quelle& Mayer, Heidelberg, 1911) 18f.

between upper categories and subcategories surfaces when simple categorial essences are assumed which determine the membership in categories. It can be resolved by restricting such essences to the lowest subcategories (the maximal division). That entails a difference between the way the lowest and the higher categories are determined. It is argued that the lowest subcategories are determined by simple categorial essences as those essences are needed for ontological laws of composition. The other categories are determined only loosely by certain criteria which are not reducible to simple essences. By means of this contrast the minimal and the maximal contrast become compatible.

The need for subcategories and for a whole categorial tree was explained by the task of analysing categorially all elementary and ubiquitous phenomena and by the relationships of categories in the respective ontological theory.

The Aristotelian Tradition fits all existents into an all-encompassing Porphyrian Tree. It is pointed out that the borderline between the categorial upper part and the lower non-categorial part of that tree which coincides with the maximal division is not easy to justify and that fact ontologies with combinatorial laws are better off with respect to that problem. The latter ontologies imply also a more complicated structure with shorter and less continuous chains of specification. They suggest that the traditional all-encompassing Porphyrian tree may be too streamlined.